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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|--------------------------|---------------------|------------------|
| 10/667,744 | 09/22/2003 | Charles Edwan Sumner JR. | 80040 | 3867 |

7590 10/04/2005
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EXAMINER

OH, TAYLOR V

ART UNIT PAPER NUMBER

1625

DATE MAILED: 10/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/667,744

Applicant(s)

SUMNER ET AL.

Examiner

Taylor Victor Oh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 August 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 21-27 and 32-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 21-27 and 32-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 8/29/05.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/29/05 has been entered.

The Status of Claims

Claims 21-27, and 32-38 are pending.

Claims 21-27, and 32-38 have been rejected.

DETAILED ACTION

1. Claims 21-27, and 32-38 are under consideration in this Office Action.

Priority

2. None.

Drawings

3. The drawing filed on 9/22/03 is accepted by the Examiner.

Claim Objections

Claims 22, 24 and 25 are objected to because of the following informalities:

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In claims 22, 24 and 25, the phrase " claim 20 or 21 " is recited. The number 20 in the claim has been deleted . However, the term " or" is still remained in front of the number 21. Therefore, appropriate correction is required.

Claim Rejections - 35 USC § 103

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

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2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 21-27, and 32-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scott et al (U.S. 4,158,738) in view of Takuma et al (EP0111784) and D.H. Meyer (U.S. 3,584,039).

Scott et al teaches a process of producing terephthalic acid by oxidation of para xylene in the following steps of :

- a. feeding a mixture of p-xylene, a lower monocarboxylic acid solvent, and water in the presence of cobalt (148 ppm) and manganese (129 ppm), and bromine (563 ppm) (see table II, col. 13) into an oxidation reactor at 210⁰ C (see col. 2, lines 42-56) in the presence of oxygen;
- b. removing the product as a slurry from the oxidizer;
- c. feeding the slurry of the terephthalic acid mixture to two additional crystallizers where the product is cooled to 105⁰ C;
- d. purifying the slurry of the terephthalic acid by filter (see col. 8, line 56), centrifuges and dryers (see col. 3, lines 39-62).

Furthermore, as a result of the process, the TPA "b" is in the range of from 0.9 to 2.0 (see col. 15, table III). In addition, it is possible to undergo the post oxidation treatment after the primary oxidation process in order to reduce further the undesirable impurities in both the terephthalic acid and the mother liquor (see col. 8, lines 7-10).

Scott et al, however, differs from the instant invention in that the pressure and the temperature, at which the centrifuge are operated , are unspecified ; decolorizing is accomplished by reacting the crude carboxylic acid solution with hydrogen in the presence of a hydrogenation catalyst; the concentration of cobalt and manganese is 1050 to 2700 ppm and the concentration of bromine is 1000 ppm to 2500 ppm; and the second oxidizing process takes place a higher temperature than the primary oxidation.

Takuma et al teaches a process of producing terephthalic acid by oxidizing p-xylene with oxygen in an acetic acid solvent in the presence of cobalt ,manganese, bromine (see col. 4 ,lines 59-64) in the following purifying steps (see col. 3 ,lines 7-25):

1) a first purifying step of feeding a gas containing molecular oxygen to the oxidation reaction mixture obtained from the main reaction step in such a proportion that the concentration of oxygen in the off-gas becomes at least 0.5% by volume and smashing the oxidation reaction mixture at a temperature of 140 to 230°C to decrease the average particle diameter of terephthalic acid by at least 20% from its average particle diameter before smashing, and

2) a second purifying step of feeding a gas containing molecular oxygen to the slurry from the first purifying step in such a proportion that the concentration of oxygen in the off-gas becomes 0.05 to 5% by volume, and contacting the slurry with the molecular oxygen-containing gas at a temperature at least 10°C higher than in the first purifying step and within the range of 180 to 300°C.

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The resulting purified slurry is subjected to solid-liquid separation to recover terephthalic acid (see col. 3 ,lines 4-6) suitable for use in direct polymerization (see col. lines 60-61).

Furthermore, the second purifying step has an advantage as described below (see col. 11 ,lines 47-57):

The slurry which has undergone smashing and re-oxidation treatments in the first purifying step is contacted with a molecular oxygen-containing gas in the second purifying step at a temperature at least 10°C higher than the temperature in the first purifying step and within the range of 160 to 300°C, preferably 210 to 260°C. The higher the treating temperature, the lower the viscosity of a mixture of the resulting terephthalic acid with a glycol and the smaller the amounts of the oxidation reaction intermediates typified by 4-CBA.

Furthermore, D.H. Meyer teaches that the impure terephthalic acid is subjected to hydrogenation in the presence of hydrogen and a Group VIII metal on an inert support ; after separation of the reaction solution from the catalyst, the crystallization is conducted to precipitate the terephthalic acid (see col. 2, lines 20-30). Any method of purifying crude terephthalic acid must reduce or eliminate impurities so as to produce the pure terephthalic acid product suitable for the production of super polyesters (see col. 2 ,lines 1-4).

With respect to the claimed concentration of claimed cobalt , manganese and

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bromine , the prior art does teach that the feed catalyst comprises cobalt (148 ppm) and manganese (129 ppm), and bromine(563 ppm) (see table II, col. 13). The claimed concentration and prior art do not overlap, but are close enough that one skilled artisan in the art would have expected them to have the same properties in the absence of an unexpected result. Furthermore, the limitation of a process with respect to ranges of pH, time and concentration does not impart patentability to a process when such values are those which would be determined by one of ordinary skill in the art in achieving optimum operation of the process. Concentration is well understood by those of ordinary skill in the art to be a result-effective variable , especially when attempting to control selectivity in a chemical process. Therefore, it would have been obvious to the skilled artisan in the art to be motivated to change from the concentration of the prior art's catalyst to the that of the claimed catalyst by routine experimentation in order to control the selectivity of the process.

Regarding the second oxidizing process conducting at a higher temperature than the primary oxidation, the Scott et al does indicate that operations at higher temperatures also improve energy (heat) recovery with the associated economic benefits (see col. 4 ,lines 42-44). Also, it is possible to undergo the post oxidation treatment after the primary oxidation process in order to reduce further the undesirable impurities in both the terephthalic acid and the mother liquor (see col. 8 ,lines 7-10). Therefore, it would have been obvious to the skilled artisan in the art to be motivated to conduct the second oxidizing process at a higher temperature than the primary

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oxidation because the operation at higher temperatures does improve energy (heat) recovery with the associated economic benefits (see col. 4 ,lines 42-44).

Scott et al does teach the process of producing terephthalic acid by oxidation of para xylene in the reactor in the presence of acetic acid solvent containing cobalt and manganese, and bromine and further purifying the resultant slurry of the terephthalic acid by a filtration or centrifuge, and a drying process. Also, Takuma et al teaches the process of producing terephthalic acid by oxidizing p-xylene with oxygen in an acetic acid solvent in the presence of cobalt ,manganese, bromine (see col. 4 ,lines 59-64) in the two oxidations with different temperature parameters (see col. 3 ,lines 7-25) for the purpose of using the terephthalic acid in direct polymerization (see col. lines 60-61). Similarly, in order to produce the pure terephthalic acid product suitable for the production of super polyesters (see col. 2 ,lines 1-4), the D.H. Meyer recommends that the impure terephthalic acid should be subjected to hydrogenation in the presence of hydrogen and the Group VIII metal on an inert support .

All processes have commonly involved in the purification of terephthalic acid by crystallization. Scott et al expressly describes the use of the centrifuge in the process of isolating terephthalic acid, whereas Takuma et al does describe the operation of the centrifuge after the two oxidations with different temperature parameters (see col. 3 ,lines 7-25) ;furthermore, the D.H. Meyer does suggest that the impure terephthalic acid should be subjected to the hydrogenation process in order to produce the pure

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terephthalic acid product suitable for the production of super polyesters (see col. 2 ,lines 1-4). Therefore, it would have been obvious to the skilled artisan in the art to be motivated to incorporate the teaching of Takuma's et al two oxidations with different temperature parameters along with D.H. Meyer's subsequent hydrogenation process into the Scott et al process for the purpose of obtaining the purified terephthalic acid acceptable for the manufacture of super polyesters (see col. 2 ,lines 1-4). This is because the skilled artisan in the art would expect such modifications to be successful and effective for the manufacture of super polyesters (see col. 2 ,lines 1-4) as shown in the D.H. Meyer.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Taylor Victor Oh whose telephone number is 571-272-0689. The examiner can normally be reached on 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cecilia Tsang can be reached on 571-272-0562. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


10/11/05